

## THE IMAGINAL DISCS OF *DROSOPHILA MELANOGASTER*.

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The location and morphology of the imaginal discs in *Drosophila melanogaster* are presented as this information is not available in literature and will be of aid to those working with this insect.

To enable one to see these discs with the microscope two methods of technique are used. These are the paraffin section and the "in toto" methods. The paraffin method is the same used for any larval material, however the "in toto" method is vastly different from any of the methods found in literature. This consisted of slitting the mature larva down the median dorsal line, evacuating the body cavity fixing the body walls in Carnoy's solution, and later staining in Delafield's Haemotoxylin. When properly done this stains the imaginal discs only, leaving the body wall free from stain.

Various dissections have shown that the imaginal discs of the head and thorax are complete at the time of pupation. The abdominal discs, however, do not become visible until eight to sixteen hours after pupation. They are best seen in the pronymph stage, appearing along the lateral sides as illustrated by figure 2. Sections were made of early larvae in the attempt to discover the origin of these discs, but evidence was not obtained from such sections. Figure 1 represents a pupa eight hours after pupation. Here the abdominal discs are plainly seen. An examination of the cross sections at the bottom of the plate, especially figure 4, shows the abdominal discs lying on and above the larval hypodermis. It is probable, therefore, that the imaginal discs are originally hypodermal. This opinion was held by Bruno Wahl ('01) and Lowne ('95) for *Eristalis* and *Calliphora*, respectively.

Posteriorly, in the last abdominal segment, the genital and rectal disc of the adult is seen (figure 1). According to Bruno Wahl ('01) it is composed of four abdominal discs which have fused; this is comparable with figure 5 in which three parts are shown.

The heavy line around the labial buds (figure 1P) and extending down and around the brain represents the inverted pharynx, a part of the first larval segment which forms the adult head. The two buds anterior to the brain are the frontal sacs containing the antenna and the compound eye discs. Ventrally and toward the sides are the three pairs of leg buds. The wing and mesothoracic bud is seen in the second segment.

If one tries to line up all of the imaginal discs of the head and thoracic complex along the outer wall in order to obtain a definite idea of their probable original position in the ectoderm, one meets with some difficulty, especially in trying to use transverse sections (figure 3). If one turns to the diagram given in figure 1, it is found that anteriorly the labial buds and the leg buds are extremely ventral, and the wing and mesothoracic buds are ventral and lateral, but the antenna and the compound eye discs appear to be more dorsal than ventral. This is, of course, a correct way of viewing the situation, because the discs of the proboscis, antennae, and the compound eyes, come from the inverted pharynx, and it is supposed that even if these discs originate from the dorsal side of the pharynx, the original ectoderm from which they were derived was of ventral origin in the embryo. This was shown to be so in a previous paper (Parks, '35).

A little later the total cephalic and thoracic complexes are everted (figure 2). The hypoderm at their bases grows dorsally and ventrally, uniting to form the hypoderm of the adult which will in turn secrete the chitinous exoskeleton. In the abdomen the eight larval segments are condensed to six. The first two fuse to form the first adult abdominal segment, the last two are involved in the genital and rectal mechanism.

The abdominal imaginal discs grow dorsally and fuse on the mid-dorsal line; ventrally they fuse in the region of the sternitals. The genital and rectal discs, of course, form the external genital and anal apparatus.

#### BIBLIOGRAPHY.

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#### PLATE VII.

##### EXPLANATION OF FIGURE 1.

"In toto" mount of a pupa eight hours after pupation. The pupa was slit down the median dorsal line and the internal organs removed, leaving only the imaginal disc complex.

1 prothorax.

2 mesothorax.  
 3 metathorax.  
 AB antennal bud.  
 LB labial bud.  
 IP inverted pharynx.  
 H theoretical position of the humeral bud.  
 L1 prothoracic leg bud.  
 L2 mesothoracic leg bud.  
 L3 metathoracic leg bud.  
 WMB wing and mesothoracic bud.  
 CEB compound eye disc.  
 MD metathoracic disc dorsal.  
 B brain.  
 FAS first abdominal segment.  
 SP spiracle.  
 VAD ventral abdominal imaginal disc.  
 DAD dorsal abdominal imaginal disc.  
 GRD genital and rectal disc.

## EXPLANATION OF FIGURE 2.

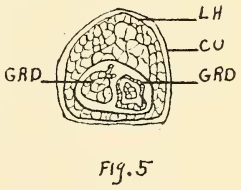
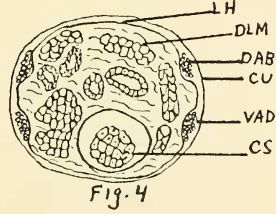
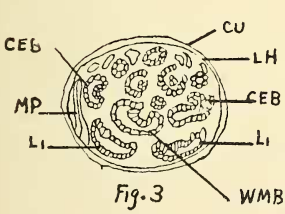
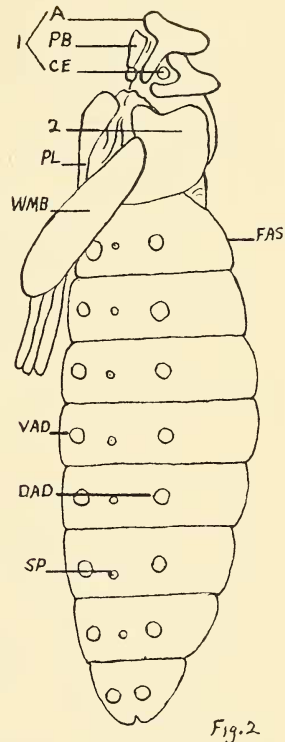
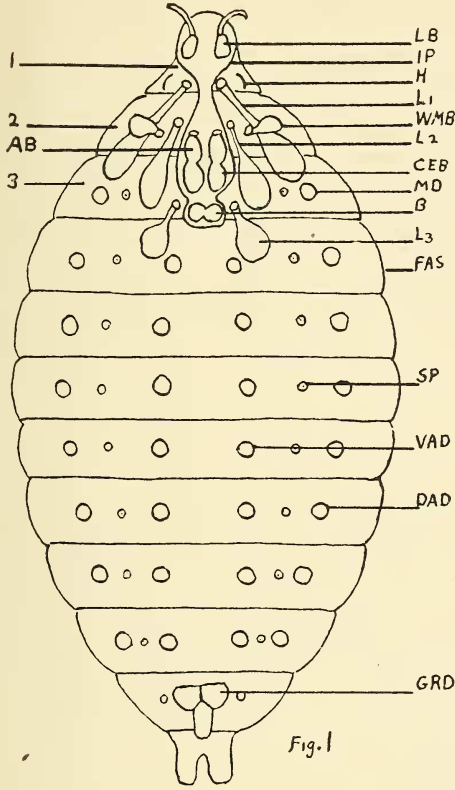
Pronymph stage showing the everted cephalic complex and the wings and legs. Along the lateral sides appear the dorsal and ventral abdominal discs.

1 { A antenna.  
 PB proboscis.  
 CE compound eye. } come from the everted pharynx.  
 2 mesothorax.  
 PL prothoracic leg.  
 WMB wing and mesothoracic bud.  
 FAS first abdominal segment.  
 VAD ventral abdominal imaginal disc.  
 DAD dorsal abdominal imaginal disc.  
 SP spiracle.

## EXPLANATION OF FIGURE 3.

Cross section through the cephalic region of a pupa about the age shown in figure 1.

CEB compound eye disc.  
 MP muscle plate.  
 LI prothoracic leg bud.  
 CU cuticle.  
 LH larval hypodermis.  
 WMB wing and mesothoracic bud.



## EXPLANATION OF FIGURE 4.

Cross section through the abdomen of a pupa about the age shown in Figure 1.

LH larval hypodermis.

DIM broken down larval material.

DAD dorsal abdominal imaginal disc.

CU cuticle.

VAD ventral abdominal imaginal disc.

CS chyle stomach.

## EXPLANATION OF FIGURE 5.

Cross section through the anal region of a pupa about the age shown in Figure 1.

LH larval hypodermis.

CU cuticle.

GRD genital and rectal disc.

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**Gregariousness in *Papilio philenor*.**—The gregarious and roosting habits of butterflies are well known especially of species of *Heliconius* and *Anosia*. It is not surprising to find other species with similar habits. On June 7 the writer was collecting near Santa Rita near the south line of Brooks County, Texas. Due to copious rains many plants were in full bloom. *Papilio philenor* was in great abundance and seemed to be the only butterfly at work. A local shower passed through the section. Just before the rainfall, not exceeding five minutes, these black butterflies raised from the flowers and headed for a large huisache tree (*Acacia farnesiana*) which stood near a ranch house. The collectors likewise sought the protection of this tree. Forty of these butterflies were counted hanging to the undersides of the limbs. They were clasped to the limbs with the wings down and their heads toward the tree, the thick leaves and branches thus giving complete protection. The ranchman on being questioned about the butterflies stated, that these butterflies came to this one tree not only to escape rain, but also to roost during the night.—H. B. PARKS, San Antonio, Tex.